Calendar

The Michigan Aeronautics Commission has announced its regular meeting schedule for 1999. As a service to the public, all meetings will be broadcast on Michigan State Government TV (MSG-TV). Check with your local cable television company for channel and schedule information. Further details about agendas, minutes, or meeting locations may be obtained by calling the Bureau of Aeronautics at 517-335-9943.

January 21 –	Lansing
March 16 –	Lansing (joint meeting with the State Transportation Commission)
May 20 –	Location to be announced
July 15 –	Location to be announced
September 16 –	Crystal Mountain
November 4 –	Lansing

Flying is Fun

1999 International Aviation Art Contest

Young artists from across Michigan are invited to enter the 1999 International Aviation Art Contest. Sponsored at the state level by the Michigan Department of Transportation, Bureau of Aeronautics, the contest seeks to encourage young people to become familiar with the many facets of aviation and aeronautics. Other sponsors include the National Aeronautic Association, the National Association of State Aviation Officials, the Federal Aviation Administration, and the Fédération Aéronautic Internationale. In recent years, Michigan artists have enjoyed national and international success. In 1998, Jake Chidester, of Brighton, was the national first-place winner in his age category. In 1996, Aaron Palaian, of Fenton, received a special citation from the international contest jury after winning first place at the state and national levels.

The theme for this year's contest is "Flying is Fun." Competition is open to students age 6-17 and will be judged in three separate age categories, with first, second, and third place winners selected in each. First-place winners in each category will advance to the national competition in Washington, D.C. National winners will compete with entries from other nations in late spring. The contest also features a separate competition for computer-generated art. Computer art will be judged only at the state and national levels.

Entries must be received by February 5, 1999. For a copy of the contest brochure, which includes rules and an entry form, please write to Michigan Bureau of Aeronautics, Attn: Aviation Art Contest, 2700 E. Airport Service Dr., Lansing, Michigan 48906-2160, or call 517-335-9977. Complete contest details are also available on the Bureau of Aeronautics website at http://www.mdot.state.mi.us/aero/.

MICHIGAN Aviation

NOVEMBER 1998

22,000 copies printed
Total cost $5460.40
Cost per issue $.2482

RECYCLED PAPER

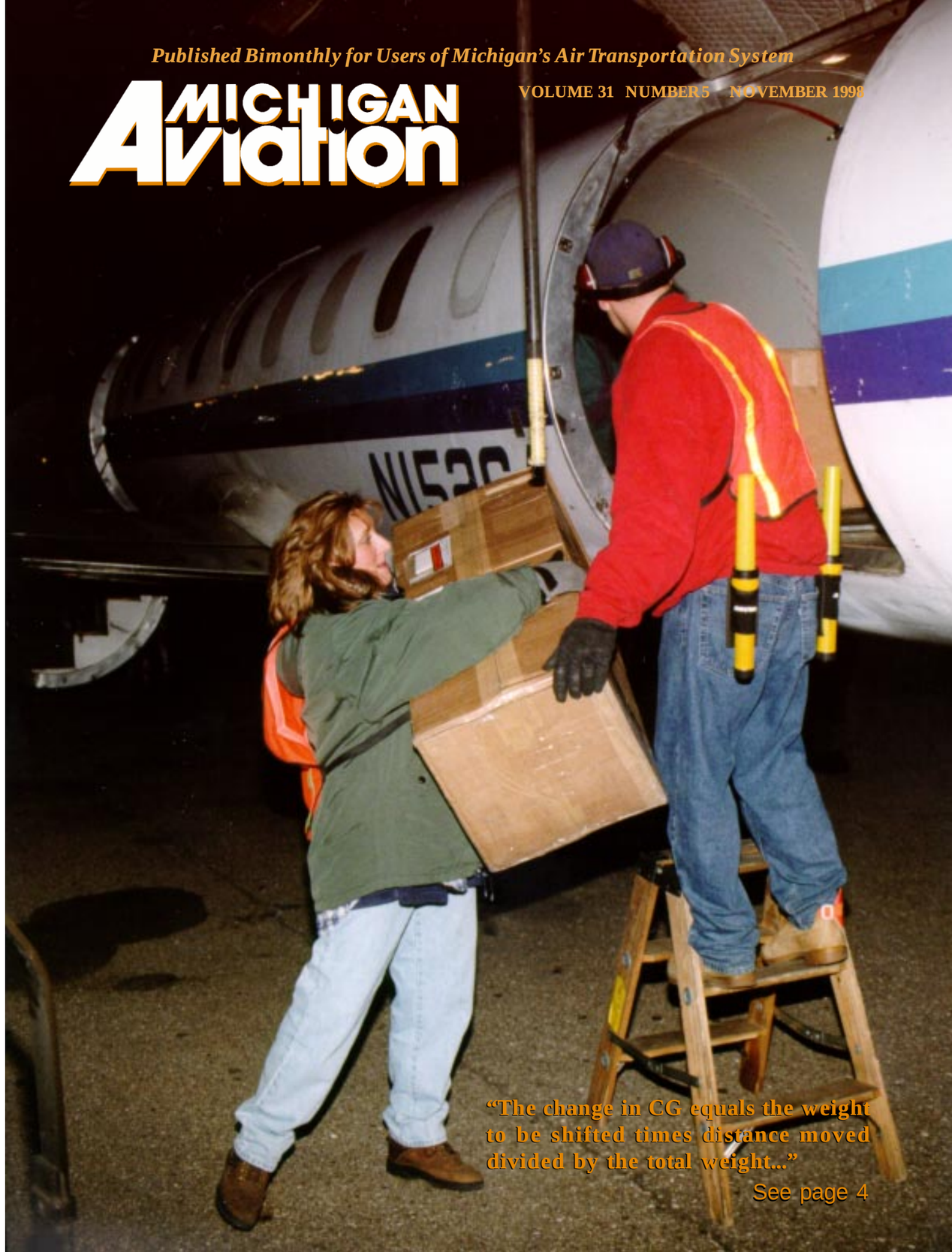
BULK RATE
U.S.POSTAGE
PAID
Lansing, Michigan
Permit No. 1200

OFFICIAL PUBLICATION, BUREAU OF AERONAUTICS, DEPARTMENT OF TRANSPORTATION
2700 E. Airport Service Drive Lansing, Michigan 48906-2171 Telephone; 517/ 335-9283
http://www.mdot.state.mi.us/aero/

Published Bimonthly for Users of Michigan's Air Transportation System

MICHIGAN Aviation

VOLUME 31 NUMBER 5 NOVEMBER 1998



"The change in CG equals the weight to be shifted times distance moved divided by the total weight..."

See page 4

COMMISSION ACTION

The Michigan Aeronautics Commission met in Grand Rapids on September 16, 1998. Among issues acted upon was the approval of $7.7 million for airport improvements at Michigan airports.

Some projects have federal, state, and local funding, while others are funded from state and/or local sources alone. Commission approval for federally funded projects authorizes state participation, subject to issuance of a federal grant. Federal and state dollars for airport development are primarily from restricted, user generated funds. The primary sources of revenue are aviation fuel and passenger taxes, as well as aircraft registration fees.

Following are approved projects:

GRANTS

ATLANTA

Atlanta Municipal Airport - an allocation of $280,000 to rehabilitate Runway 5/23 and to install runway lights. The proposed budget consists of $252,000 state and $28,000 local funds.

BATTLE CREEK

W. K. Kellogg Airport - an allocation of $220,000 to rehabilitate Taxiway G. The proposed budget consists of $198,000 federal, $11,000 state, and $11,000 local funds.

JACKSON

Jackson County-Reynolds Field - an allocation of $1,800,000 to rehabilitate Runway 6/24. The proposed budget consists of $1,557,000 federal, $86,500 state, and $156,500 local funds.

MANISTEE

Manistee County-Blacker Airport - an allocation of $1,700,000 to relocate the VOR (a ground-based navigation aid) and for the first phase of a project to reconstruct Runway 9/27. The proposed budget consists of $1,530,000 federal, $85,000 state, and $85,000 local funds.

NEWBERRY

Luce County Airport - an allocation of $600,000 to rehabilitate Runway 11/29, Taxiway A, and the terminal apron. The proposed budget consists of $540,000 federal, $30,000 state, and $30,000 local funds.

OSCODA

Oscoda-Wurtsmith Airport - an allocation of $500,000 to rehabilitate a portion of the terminal apron. The proposed budget consists of $450,000 federal, $25,000 state, and $25,000 local funds.

SANDUSKY

Sandusky City Airport - an allocation of $600,000 to rehabilitate and widen Runway 9/27. The proposed budget consists of $540,000 state and $60,000 local funds.

THOMPSONVILLE

Thompsonville Airport - an allocation of $500,000 to pave and light Runway 9/27, a taxiway, and the terminal apron. The proposed budget consists of $450,000 state and $50,000 local funds.

WEST BRANCH

West Branch Community Airport - an allocation of $1,500,000 to rehabilitate Runway 9/27, a taxiway, and apron. The proposed budget consists of $1,350,000 federal, $75,000 state, and 75,000 local funds.

The 67th annual meeting of the National Association of State Aviation Officials (NASAO) was held September 13-15 in Grand Rapids. In the photo collage above from left to right: Lowell Kraft, Chairman, Michigan Aeronautics Commission; Rep. Vernon Ehlers, Keynote Speaker; William E. Gehman, Director, Michigan Aeronautics Commission; James DeSana, Director, Michigan Department of Transportation; and Bill Gehman, accepting appointment as NASAO Chairman. Photos by Tim Burke

Aviation In-formation

The Michigan Aviation Hall of Fame announced its 1998 inductees on October 10, 1998. During a ceremony held at the Kalamazoo Aviation History Museum, four individuals were honored for their contributions to aviation in Michigan.

Brigadier General Floyd E. Evans was founder of the Michigan Air National Guard. He was appointed director of the Michigan Aeronautics Commission (MAC) in 1930 and is still the longest serving MAC director. General Evans died in 1966.

Wilbur C. Nelson, a native of Flint, served as chairman of the University of Michigan, Aeronautical Engineering Department from 1953 to 1968.

Lt. General Richard A. Burpee was born in Denton, Michigan. Among his accomplishments during a distinguished Air Force Career were 336 missions over Vietnam, numerous decorations, and assignment as commander of the 15th Air Force at March Air Force Base in California. He currently resides in Oklahoma City.

Herbert E. Swan, a native and current resident of Michigan, was twice appointed to the MAC. He was chairman of the committee to relocate the Sault Ste. Marie airport to the former Kinchloe Air Force Base. In 1986, he founded and became president of the Michigan Aviation Hall of Fame.

Weight, Balance, and Performance, Continued from page 5

establish a *center of gravity range*, or often called the *center of gravity envelope*. This established range allows the center of gravity to be placed at a reasonable distance either fore or aft of its optimal position. It is important to note that movement of the CG within the allowable range will have a significant influence on its flight characteristics. If the CG is positioned outside of these limits, either fore or aft, serious detrimental control problems will develop. Chart 1 illustrates the effects of locating the CG either fore or aft of the optimal CG location throughout various phases of flight.

Obviously, there is much more surrounding weight and balance than this article had space for. For a more in-depth and informal discussion, please attend one of the weight and balance safety seminars sponsored by the Michigan Bureau of Aeronautics. For a complete schedule of these events, visit our web site at www.mdot.state.mi.us/aero/.

Situation	Forward Center of Gravity	Aft Center of Gravity
Stability	More stable.	Less stable.
Control Pressures	Increased control pressures.	Light control pressures.
Airspeed	Lower indicated airspeed.	Higher indicated airspeed.
Power	More power is required.	Less power is required.
Stalling Speed	Stalling speeds are higher.	Stalling speeds are lower.
Stall Characteristics	Uneventful.	Violent.
Stall Recovery	Stall recovery is easier.	The stall recovery is hard to impossible.
Take-Off	Longer takeoff roll.	Less speed is needed toget airborne. However, the aircraft may not have enough speed to fly.
Landing	Excessive loads on the nosewheel.	Risk of a tail strike.
Fuel Consumption	Fuel consumption will increase.	Less fuel is burned.
Range	The aircraft's range is reduced.	The aircraft's range is increased.

Chart 1

Aviation In-formation

The Federal Aviation Administration (FAA) has issued a notice of proposed rulemaking which would require installation of advanced, high-technology, ground proximity warning systems on many aircraft. Unlike current radar altimeters, which simply show an airplane's present height above the ground, these systems feature a detailed onboard terrain database which allows the system to actually "look forward" and give pilots advanced aural and visual warning of an impending collision with terrain. The proposal would require these systems on all turbine-powered airplanes certified with six or more passenger seats (not including pilot and co-pilot seats).

In other FAA rulemaking news, the agency has extended (until January 6, 1999) the deadline for comments on its controversial plan to revamp certification of aircraft maintenance technicians. The proposal consolidates all certification, training, and experience requirements for aviation maintenance personnel into one newly-established part of the Federal Aviation Regulations. Among other provisions, the new rule would create additional certificates and ratings, and would modify the privileges and limitations of current certificates. Many industry groups have expressed serious concerns about increased bureaucracy, additional cost, and burdensome limitations which they claim would be placed on mechanics and repair stations if this rule were adopted.

With the comment period recently passed, helicopter pilots are awaiting FAA's final determination on an amendment to the general operating rules pertaining to alternate airport requirements for helicopters operating under instrument flight rules (IFR). Present rules require that helicopter pilots operating under IFR adhere to nearly the same alternate airport and fuel reserve requirements as pilots of airplanes. However, they are allowed to fly under visual flight rules (VFR) in airspace not subject to air traffic control without regard for an alternate airport. The inadvertent result is that many times pilots will choose to remain VFR, in marginal conditions, to avoid the requirements for alternate airport and fuel reserves rather than take advantage of the air traffic system under IFR. FAA believes that overall safety would be enhanced by revising the rules to recognize the unique operational capabilities of helicopters. Industry advocacy groups, including the Helicopter Association International, have endorsed the proposal. The full text of this proposal, as well as the proposed rules mentioned in the two paragraphs above, is available on the internet at http://www.faa.gov/avr/arm/nprm/nprm.htm

Nominations are being sought for the 36th annual General Aviation Industry Awards Program. This prestigious national award recognizes an outstanding aviation maintenance technician, an avionics technician, and a certified flight instructor. The national winner in each category is selected from district and regional winners. These awards are sponsored cooperatively by FAA and other industry organizations including the Aircraft Owners and Pilots Association, the General Aviation Manufacturers Association, the Helicopter Association International, the National Association of State Aviation Officials, the National Business Aircraft Association, the Experimental Aircraft Association, and the Professional Aviation Maintenance Association. Award nominees will be judged on the basis of specific accomplishments and sustained superior performance in their fields. The application package must include a resume, an explanation of industry accomplishments, an essay describing why the applicant is deserving of the award, letters of recommendation, a list of awards and other recognition, and other supporting documentation. Applications are available from the FAA Flight Standards District Offices in Detroit (734) 487-7222, Grand Rapids (616) 954-6657, or South Bend (219) 236-8480. They are also available from the Bureau of Aeronautics at (517) 335-9977.

Pilots preparing for an instrument rating should be aware that the Practical Test Standards (PTS) have been revised. The new PTS, which became effective October 1, 1998, sets forth standards for issuance of instrument ratings for airplane and helicopter pilots. One of the most significant change involves non-precision instrument approaches. Previously, applicants were required to demonstrate VOR and NDB approaches. The revised PTS now specifies that two separate non-precision approaches, using different navigation systems, be performed. The examiner will decide which specific procedures will be demonstrated. In addition to the two non-precision approaches, an ILS approach is still required.

Mackinac County Airport in St. Ignace is one of the only general aviation airport in the Upper Peninsula with a concrete runway. A major project, which was completed in mid-September, involved extending the runway by 400 feet (to a total length of 3800 feet) and constructing a parallel taxiway. The use of concrete, instead of asphalt, will dramatically decrease, if not eliminate, the need for routine pavement maintenance over the next twenty years. Engineering for the project was done by URS Greiner, Inc., of Grand Rapids. The prime contractor was Ajax Paving Industries, Inc., of Troy, and the extensive grading necessary was done by Bacco, Inc., of Iron Mountain. Funding for the project included $800,000 federal, $665,000 state, and $114,000 local money.

In Michigan air service news, German carrier, Lufthansa, will begin daily non-stop service between Detroit and Frankfurt on March 28, 1999, using Airbus A340 aircraft. On October 25, 1998, Northwest Airlines began two daily non-stop flights between Flint and Minneapolis. The service will be operated by its Airlink affiliate, Mesaba Aviation, using the new AVRO RJ85 jet aircraft. And finally, on October 26, KIWI International Air Lines initiated daily non-stop service between Flint and Newark, New Jersey.

Continued on page 7.

DIRECTOR'S DESK

William E. Gehman
Director, Michigan Aeronautics Commission

Editor's note: At the 67th annual meeting of the National Association of State Aviation Officials (NASAO), held September 13-15 in Grand Rapids, William E. Gehman, Deputy Director, Michigan Department of Transportation, Bureau of Aeronautics was elected Chairman of the organization. As he received the Chairman's gavel, Michigan Governor John Engler issued a proclamation saluting Gehman's achievements. "Bill is an outstanding public administrator and tireless champion for aviation who will take NASAO to new heights," said Engler. "His top-flight leadership in developing Michigan's airport system, attracting and preserving commercial air carrier services, and promoting pilot safety has made Michigan's aviation program a model for other states."

It is with great pride and sense of commitment that I begin a year-long term as Chairman of the National Association of State Aviation Officials. Founded in 1931, NASAO is among the oldest aviation organizations in the nation. It even predates the Civil Aeronautics Authority (CAA), which was the predecessor of the current Federal Aviation Administration (FAA). By its nature, aviation is a global enterprise. The many issues and challenges facing it do not recognize state or national borders. Indeed, their solutions lie in cooperation and partnering across those borders and among the many diverse stakeholders in the aviation and aerospace industry. NASAO is committed to being a leader in ensuring the success of these partnerships.

NASAO and its Washington, D.C. staff represent the interests of the states to Congress and the Administration. Additionally, we work closely with the Department of Transportation, National Aeronautics and Space Administration, the Transportation Research Board, the National Governors Association, and the American Association of State Highway and Transportation Officials. We are proud to be the only organization of our type to have an official Memorandum of Understanding with the FAA. Among my goals this year is to strengthen our alliances with these organizations and to encourage active participation in NASAO activities among all members. In the following paragraphs I have highlighted some of the many challenges and opportunities NASAO and its member states will face this year.

AIRPORT IMPROVEMENT PROGRAM FUNDING

Among the most important priorities for NASAO is to ensure continued funding of the Airport Improvement Program (AIP) at an adequate level. NASAO recommends, that a minimum of $2 billion annually, over the next five years, is necessary to insure the nation's air transportation infrastructure is able to meet public needs. Indeed, nothing less than America's economy, health, welfare, and safety depend on this infrastructure. NASAO has been joined in this recommendation by the Air Transport Association, which represents the nation's airlines, the congressionally-mandated, nonpartisan National Civil Aviation Review Commission, and many other Washington-based aviation associations.

STATE-WIDE AVIATION SYSTEM PLANNING

Each state has developed an aviation system plan and an airport capital improvement plan. These documents outline the projected needs for airports and allow state agencies to allocate funding to meet those needs. Each year, approximately $450 million is invested in planning, operations, infrastructu re development, maintenance, and navigation aids at the nation's 6,000 airports. Funding for planning assists states in complying with grant conditions, protection of runway approaches, and maintenance of a current airport layout plan. Additionally, system planning includes the development of economic impact studies, reviews of passenger and cargo service, airport facilities, and equipment. Many states are including studies of the effects of the impending transition from ground-based to satellite navigation as part of their system plans. Until 1996, legislation which authorized funding for airport improvements included a "set-aside" specifically for system planning. For the past two years, without these funds, state planning efforts have been severely impaired. NASAO will be working hard to see that these funds are included in future versions of airport improvement legislation.

STATE BLOCK GRANT PROGRAM

Michigan is one of nine states participating in the State Block Grant Program. Originally begun as a pilot program in 1987, it was made permanent in 1996. This program greatly streamlines the process of obtaining federal funds for airport improvement projects. It is truly a win-win situation for each partner in the airport improvement process. Block Grant states work closer with individual airports, and are more directly involved with local issues; including ensuring compliance with conditions of funding grants. Workload for FAA airport engineers is reduced, allowing them to concentrate on large air carrier airports. NASAO is urging Congress to expand the State Block Grant Program by making it available for voluntary participation to all qualifying states.

AVIATION SAFETY PROGRAMS

Many states, including Michigan, have active and successful pilot safety programs. NASAO members will be working closely with FAA on a decade-long initiative to reduce fatal accidents by 80 percent. The program, dubbed "Safer Skies," is an admittedly ambitious undertaking, that will involve cooperation among all segments of the aviation industry. It will focus the combined efforts of many organizations to find the root causes and determine ways to break the chain of events leading to accidents. the program will address six specific areas; pilot decision making, loss of control, weather, controlled flight into terrain, crash survivability, and runway incursions.

AVIATION EDUCATION

NASAO and FAA have traditionally enjoyed a productive partnership in aviation education. Working together, FAA and the states have conducted countless Aviation Career Education (ACE) camps for young people across the country. The highly successful International Aviation Art Contest has exposed students to the many different facets of aviation and aerospace. Teacher workshops have given educators the tools and skills needed to incorporate aviation concepts into their daily lesson plans. In the year ahead, NASAO will be active in all of these areas as well as working closely with FAA in new endeavors such as the Community Aviation Partnering Program and the Garrett A. Morgan Initiative.

Weight, Balance, and Performance

By Phillip M. Tartalone

On June 3, 1990, after landing his Beech Bonanza at the Gaylord/Otsego County airport, the pilot told the attendant that he was "concerned" about the aircraft's weight. He asked that the aircraft be refueled to the "tabs," and proceeded to load three passengers and their baggage. As the aircraft departed from runway 27, the winds were reported to be from 260 degrees at 20 knots, gusting to 30 knots. Witnesses reported that the aircraft accelerated slowly and had an unusually long takeoff roll. After becoming airborne, it was observed to have a slow rate of climb and an extremely nose-high attitude. Another witness said that the aircraft was "staggering: doing a slow porpoising motion, and not gaining airspeed." The aircraft then banked to the left, descended, impacted the ground and burst into flames. There were no survivors. Investigators from the National Transportation Safety Board determined that the aircraft was loaded to 80 pounds over its maximum gross weight, and that its center of gravity was 1.7 inches behind its aft limit.

On April 19, 1998, a private pilot, in a Piper Cherokee 140, attempted to take off from the Kalamazoo/Battle Creek International Airport. On board were the pilot and three adult passengers. The aircraft impacted the ground only 150 yards from the departure end of the runway, cartwheeled twice, and burst into flames. All four occupants were killed.

Too often, pilots recognize weight and balance as an exercise left over from their training and fail to calculate (or even consider) the aircraft's loaded condition. They proceed with the aircraft crammed beyond its limits–often with catastrophic results. Others will reduce weight and balance to an operational rule of thumb: "With full fuel, I can carry three 180 pound passengers." Admittedly, such a rule of thumb will suffice in most cases. As a standard, however, with full fuel, all of the seats occupied, and a full baggage compartment, most general aviation aircraft are well outside their weight and balance envelope. As the name implies, there are two parts to the weight and balance equation–weight ***and*** balance. If either of these items is ignored, miscalculated, or taken for granted, the aircraft may be uncontrollable in flight, or worse, might not fly at all. In this article, I will discuss the principles of weight and balance, and the effects that loading an aircraft improperly will have on its performance and stability.

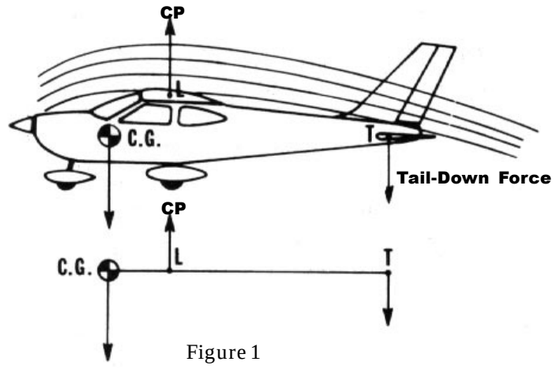


Figure 1

Weight and Performance

The simplest, and perhaps the most important, calculation is weight. Loading an aircraft at or above its certified gross weight reduces its published flight performance in virtually all parameters, save one–rate of descent. An overweight aircraft has a higher takeoff speed, longer takeoff roll, reduced rate and angle of climb, lower maximum service ceiling, shorter range, reduced cruising speed, decreased maneuverability, higher stalling speed, higher landing speed, and a longer landing roll. In addition, structural damage is more likely during hard landings or landings on unimproved surfaces.

To establish safe loading limits, aircraft manufacturers do extensive testing before initial airworthiness certification. Engineers assess the aircraft's performance and structural strength to ensure that it can withstand the dynamic loads caused by in-flight maneuvering. These tests also determine the weights defining the aircraft's normal and utility categories, and its CG envelope. Sometimes they prescribe different maximum weights for specific operations. For example, they might assign an aircraft a maximum ramp weight, a maximum takeoff weight, and a maximum landing weight. In addition, weight limits are defined for the seats, cabin floors, and baggage compartments. It is imperative that pilots adhere strictly to the limitations set forth by the manufacturer because doing otherwise can result in severe structural damage to the aircraft. (Figure 1)

Balance

One critical decision made when designing an aircraft is the relationship between the center of gravity and the center of pressure. The *center of gravity* (CG) is that theoretical point where all the weight of the aircraft is centered–the balancing point of the aircraft. The *center of pressure* (CP), or the *center of lift*, is the point along the chord line of the wing where lift is considered to be concentrated. Normally, airplanes are designed with the center of gravity ahead of the center of pressure, making the airplane nose heavy. The horizontal stabilizer, which creates a *"tail-down force,"* counters this unbalanced situation and provides the necessary balance in most flight conditions. Tail-down force is ideal for longitudinal stability, but it is aerodynamically inefficient. Since the tail is flying down, it creates extra weight for the main wings to support, and essentially, makes the airplane heavier. Consequently, the airplane performs much differently than it would if its CG were farther aft . A slipstream of air over the fuslage exerts additional downward force on the horizontal stabilizer. As engine power is increased, the downwash of air will increase and the nose will tend to rise. If there is a power reduction, the downwash will decrease and the nose will drop. On T-tail airplanes, this force is not a factor. The slipstream flows under the horizontal stabilizer and does not affect the tail-down force.

Load Distribution

To insure that an aircraft is stable in flight, and to provide the pilot some degree of flexibility, designers